



Reflections

Function

Transformations

If $g(x) = -f(x)$, the graph is reflected across the x -axis. Similarly, for polar coordinates, if $r < 0$, the point $(|r|, \theta)$ is reflected across the pole.

-Note-

If $r < 0$, an alternative way to plot the point (r, θ) is to plot the point $(|r|, \theta + 180^\circ)$.

Example 1

Plot these points on polar paper.

$A(2, 240^\circ)$ $B(4, -210^\circ)$ $C(5, 450^\circ)$ $D(-3, 150^\circ)$

Solution

- $A(2, 240^\circ)$: On the polar axis, move to the circle with $r = 2$, and then rotate 240° counterclockwise from the polar axis and plot a point on this circle.
- $B(4, -210^\circ)$: On the polar axis, move to the circle with $r = 4$, and then rotate 210° clockwise from the polar axis and plot a point on this circle.
- $C(5, 450^\circ)$: On the polar axis, move to the circle with $r = 5$, and then rotate counterclockwise one complete revolution (360°) plus an additional 90° and plot a point on this circle.
- $D(-3, 150^\circ)$: On the polar axis, move to the circle with $r = 3$, and then rotate counterclockwise 180° (where $r = |-3|$). Then rotate counterclockwise a further 150° . Are there any other ways to do this?

Focus Questions

- Graph point $Q(4, 135^\circ)$. Find other coordinates for the same point Q that satisfy each condition.
 - r is negative
 - θ is negative
 - $\theta > 360^\circ$
- What are the polar coordinates of the pole? Is there more than one possible set of coordinates? Explain why or why not.
- (a) Plot each point.
 - $A(1, 50^\circ)$
 - $B(3, 225^\circ)$
 - $C(5, 300^\circ)$
 - $D(-2, 230^\circ)$
 - $E\left(1.5, \frac{2\pi}{3}\right)$
 - $F\left(-1, \frac{7\pi}{6}\right)$
- (b) Give two other pairs of polar coordinates for each point from part (a).